

REMARKS

By this amendment claim 3 has been amended to correct informalities by deleting redundant recitation and to clarify the operation of the control unit. Claims 1-8 remain pending in the application, of which claims 1, 2, and 4-8 have been withdrawn from consideration.

The present invention is directed to an ultrasonic imaging device, illustrated schematically in FIG. 1, comprising a control unit 10 which sends ultrasonic pulse signals for forming an ultrasonic beam to be given to a scanned object and receives a received ultrasonic beam formed from the ultrasonic pulse signals reflected from the scanned object, a transmitted ultrasonic beam former 23 which forms transmitted ultrasonic beam in response to the ultrasonic pulse signals, an ultrasonic probe 32 which receives an output from the transmitted ultrasonic beam former 23 via a transmission/receiving separator 31 and sends the transmitted ultrasonic beam to the scanned body, and a receiving beam former 24 which receives the ultrasonic pulse signals reflected by the scanned object received with the ultrasonic probe 32 via the transmission/receiving separator 31 and forms the received ultrasonic beam. The control unit 10 has a program for synthesizing B-mode image data of the scanned object imaged from a plurality of angular directions and displaying the synthesized image. The control unit 10 computes correlations between the received ultrasonic beams for frames imaged from the plurality of angular directions, selects a reference frequency for detection for the received ultrasonic beam according to a result of the computation of the correlations, and sets the reference frequency to a value equal to a central frequency of the ultrasonic pulse signals when the correlation value is equal to a prespecified value.

The imaging device in accordance to the present invention allows for

improvements in image quality of moving body parts achieved by optimizing improvements in contrast resolution and improvements in spatial resolution obtained by correlation between the received ultrasonic beams for frames imaged from the plurality of angular directions. The control unit 10 computes correlations between the received ultrasonic beams reflected from moving parts of the scanned body from the plurality of angular directions, uses the correlation to calculate the displacement/deformation of the body parts, and, based on the amount of displacement/deformation, selects the reference frequency utilized for detection.

When the displacement/deformation of the scanned moving body parts is small relative to a predetermined value and the improved spatial resolution of a coherent detection is desired, **based on the obtained correlation results, a reference frequency for RF detection is selected and accumulated coherent RF signals are used for envelope detection**. If the displacement/deformation of the moving parts is large relative to a predetermined value and improved contrast resolution of incoherent detection is desirable, the signal processing is executed by synthesizing incoherent envelope signals, and high contrast images are formed based on the incoherent signals.

More specifically, image optimization by actively switching, depending on the amount of displacement, between incoherent and coherent imaging using selected reference frequency which is proportional to the amount of displacement, is illustrated in FIGs. 2-4 and described at pages 12-26 of the specification.

Claim 3 stands rejected under 35 U.S.C §102(e) as being anticipated by U.S. Patent Application Publication No. 2003/0171668 to Tsujino et al. ("Tsujino"). Applicants respectfully traverse the rejection.

As to the requirements to support a rejection under 35 U.S.C. §102, reference is made to the decision In re Robertson, 49 USPQ 2d 1949 (Fed. Cir. 1999), wherein the court pointed out that anticipation under 35 U.S.C. §102 requires that each and every element as set in the claim is found, either expressly or inherently described in a single prior art reference. As noted by the court, if the prior art reference does not expressly set forth a particular element of the claim, that reference still may anticipate if the element is “inherent” in its disclosure. To establish inherency, the extrinsic evidence “must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.” Moreover, the court pointed out that inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.

In applying Tsujino to the claimed invention, the Examiner in the Office Action at pages 2 and 3 mischaracterizes the disclosure of Tsujino utilizing the language and elements of claim 3 which have no basis in the disclosure of Tsujino. Contrary to the Examiner’s allegation that Abstract and claims 1-3 and 10 of Tsujino anticipate claim 3, Tsujino only discloses an ultrasonic apparatus for tracking position information of a region of interest (ROI) (a cardiac for example), without manual operation of an operator. For example, in the Abstract, Tsujino recites:

...the extracting unit extracts a plurality of trackable characterizing points based on the acquired image data, the tracking unit tracks the movement of the characterizing points, and the physical parameter calculating unit acquires specific physical parameters, such as displacement, distortion and distortion velocity, based on the

information derived from tracked results, of the characterizing points contained in each region of interest (ROI).

It is apparent that Tsujino, contrary to the position of the Examiner, does not disclose or teach at least the recited features of claim 3 of **“selecting a reference frequency for detection for the received ultrasonic beam according to a result of the computation of the correlation, and setting the reference frequency to a value equal to a central frequency of the ultrasonic pulse signals when the correlation value is equal to a prespecified value.”**

Therefore, Applicants submits that claim 3 patentably distinguishes over Tsujino in the sense of 35 U.S.C. §102, and should be in condition for allowance.

For the forgoing reasons, issuance of a favorable action is respectfully requested.

To the extent necessary, applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 520.45715X00), and please credit any excess fees to such deposit account.

Respectfully submitted,

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